Exhibit 2

"Deployment of Broadband Networks and Advanced Telecommunications"

Responses to the Notice & Request for Comments

Docket No. 011109273-1273-01

National Telecommunications and Information Administration

U. S. Department of Commerce

by

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on behalf of

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*Qualifications of Professor Harris are presented in Appendix A.

Exhibit 2

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1 Toward a National Broadband Policy

I commend the NTIA for its initiative in addressing the need for a national policy to promote innovation and investment in broadband access and applications. Since the passage of the Telecommunications Act of 1996, the Internet has become a dominant feature of the communications landscape. At the time, the Internet was in its infancy; some wondered if it was any more than a passing fancy, so it is not surprising that the Act was concerned almost solely with voice-grade communications. In less than six years since the passage of the Act, the Internet has become one of the most significant and revolutionary technological changes of human history. Thus, there can be no doubt about the power of digital convergence to accelerate technological innovation, and the potential benefits of broadband access to further stimulate productivity and economic growth; improve education and access to information; and increase a community through connectivity.

While few could foresee the Internet explosion at the time, Congress did recognize, in generic terms, the importance of public policies to promote the development of advanced telecommunications services, which surely would include broadband access. In Section 706 of the Act, Congress instructed that:

> The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.[1]

A reasonable reading of this provision of the Act suggests that very different regulatory polices toward advanced services—especially broadband access—should have been implemented by the FCC and state commissions. Unfortunately, that has not been the case: in their implementation of the Act, the Federal Communications Commission (FCC) and state commissions have developed regulatory policies that are one-sided: incumbent local exchange carriers (ILEC's) are heavily regulated, while their competitors are not, whether "competitive" local exchange carriers (CLEC's), cable operators, inter-exchange carriers (IXC's), mobile carriers, satellite carriers, stationary wireless carriers, or any other mode of communications or type of service provider. Rather than "removing barriers to infrastructure investment" in broadband networks, regulators appear to have been erecting them. For that reason, broadband access is not developing at the rate it could be.

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1 Telecommunications Act of 1996, Section 706. (Hereinafter "TA96.")

Fortunately, there is growing recognition of the need for major changes in our nation's public policies, and the NTIA can and should play an important role in that process. As it undertakes that effort, I strongly support the "Guideposts for Broadband Policy Development" enumerated by NTIA Administrator Nancy Victory:

- facilitating deployment of new technologies by eliminating any roadblocks;
- promoting efficient facilities investment to gain the network reliability and security advantages of a diversity of facilities-based competitors;
- promoting competition in a technology-neutral way and being mindful that the market "might not always work as well or at the same pace in all areas."[2]

Likewise, the leadership of the FCC has acknowledged the need for major policy changes. Chairman Powell has noted that development of a national broadband policy is necessary to correct what thus far had been government policy of "lurching and reacting" to unanswered questions about broadband.[3] Commissioner Abernathy has urged that policy-makers to learn from experience in the wireless and long distance service markets-that relying on market forces as much as possible offers the '"best means of delivering innovative services and lower prices to consumers." She also cautioned against the "risks associated with too much regulation," noting that the FCC lost sight of the "danger of over-regulation" in its efforts to implement the Telecommunications Act of 1996. She expressed the FCC's intent "to restore the incentives for facilities-based investment that Congress intended… This means a shift away from policies that actively encourage resale as a long-term business strategy and force the unbundling of virtually every network element at rates based on TELRIC."[4]

It should be understood, though, that regulatory changes will not come easily. Many firms benefit from regulatory policies that hamper their competitors. During the past six years, CLEC's, IXC's and cable companies have been strident advocates of regulations that apply asymmetrically to only one class of service providers, the ILEC's. No matter that those regulations hinder innovation and investment in broadband infrastructure. Moreover, state commissions have, in some cases, gone even beyond the FCC in adopting regulations that increase obstacles and reduce incentives for investment in broadband access.

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[2] Nancy Victory, National Telecommunications and Information Administrator, speech to Competitive Policy Institute conference in Washington, as reported in Telecommunications Report Daily, December 6, 2001.

[3] FCC Chairman Michael Powell, speech to ALTS Conference, Arlington, Va., November 30, 2001, as reported in TELECOM A.M. Vol. 7, No. 232, December 3, 2001. (Hereinafter "Michael Powell, ALTS Conference.")

[4] FCC Commissioner Kathleen Q. Abernathy, speech to Competition Policy Institute, Washington, December 7, 2001, as reported in Telecommunications Report Daily, Dec. 7, 2001.

Thus, the NTIA has a critical role to play in advocating and organizing changes in public policy. Many of the necessary changes can be accomplished through administrative proceedings; in some cases, though, legislative changes will be required. In either case, the NTIA can and should be a voice for change in regulatory, tax and right-of-way policies, and by encouraging government agencies to "lead by example" in their own use of broadband services, through procurement practices.[5] In much the same way that the government has been a key customer for other new technologies (and sponsored the early development of the Internet), the government can demonstrate the efficacy of broadband applications and thereby increase demand for more rapid investment in broadband networks.

2 Defining Broadband Access

2.1 Broadband and Digital Convergence

Both wireline and wireless networks were designed and built to carry analog traffic (voice, audio or audio-video). As the use of PCs for Internet and remote Local Area Network (LAN) access increased, end users added terminal equipment to move data over those voice networks (hence, modems to convert digital signals to analog signals, and Internet connections via “dial-up access”). This represented the first stage in the development of data networks. We are now well into the next stage: with digital convergence, carriers will need to substantially upgrade the existing infrastructure to carry voice, data and video. The expensive process of upgrading analog networks (copper twisted pair or coaxial) to provide digital access is well along, but the cost of upgrading increases markedly as one moves from the dense core of those networks in the major cities to the less dense peripheries in rural areas.

The fundamental change in these developments is from analog to digital and circuit- to packet-switched networks. This shift not only increases access speeds (typically from analog rates of 28-56 kbps to digital rates of 256 kbps –1.5 Mbps), but, even more importantly, “digital convergence” facilitates intermodal competition (i.e. competition among services provided over different technologies), and interconnection of and interoperability across modes. No wonder Chairman Powell has lamented “pervasive references to broadband as ‘a simple incremental advance from telephone service.’"[6]

Digital convergence also represents a technological paradigm shift, in that the rate of technological change (e.g., the rate at which bandwidth increases) will occur much faster than it did in analog networks. As this paradigm shift occurs,

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5 Bruce Mehlman, Assistant Secretary--Technology Policy, U.S. Department of Commerce, speech to Competitive Policy Institute, Washington, December 7, 2001, as reported in Telecommunications Report Daily, Dec. 7, 2001. (Hereinafter “Bruce Mehlman, Competitive Policy Institute.”)

6 See Michael Powell, ALTS Conference.

telecommunications will come much closer to following Moore's law,[7] since microelectronics (and opto-electronics) will drive technological change in digital networks. This will be a major benefit: consider, for example, how long it took to evolve from 300 baud or .3 kb modems to 56 kb modems on the one hand versus the much faster rate of change from OC-3 to OC-192 and beyond. These differential rates of change flow directly from the inherent differences in analog versus digital technologies.

Thus, the fundamental distinction that should be made in defining "broadband" access is NOT transmission speed, but class of technology. On one side are legacy analog systems that deliver audio, video and voice over wires or airwaves. Even though those networks can be used to send data in digital form, they were not designed to do so. On the other side are networks that provide access by means of "data-rate, always-on, digital packet" transmission.

Thus, to capture this paradigm shift in communications and to form the basis for public policies that will promote wider and more rapid deployment, broadband access should be defined in these terms: "*any network or technology that is built or modified to carry digital data traffic and provide end users with always-on access to one or more data networks*."[8] In short hand, "broadband" equals "digital data," where data can be used to carry an enormous range of information—words, numbers, voice, audio, pictures, video, etc. The distinguishing characteristic of digital data networks is that they enable digital devices to speak to each other in their own language.

This definition also captures the fundamental difference between users adding equipment (e.g., a modem) to allow digital devices to communicate over <u>analog</u> networks and modifying or building networks that are <u>digital</u>. In the latter case, the incentive—or disincentive—effects of public policies on technological innovation and network investment become crucial factors in the rate of deployment and adoption. In the days of analog modems, it was expenditures by consumers that determined the rate of Internet access penetration, given a ubiquitous analog network. Today, and more so in the future, investment by carriers and service providers in expanding and developing new digital networks—by whatever technology—will determine the availability of broadband access.

As a practical matter, this definition of broadband implies access speeds equal to or greater than 256 kb downstream, the minimum speed for most cable modem and DSL users. However, this definition will not be static with respect to bandwidth: as computer processing speeds increase, larger storage capacities decrease in cost

[7] Moore's law states that the amount of information that can be stored on a silicon chip doubles every 18 months. More generally, Moore's law represents the doubling of functionality on electronics every 18 months.

[8] It is conceivable that there may develop broadband digital access that is not always-on, so that should not be considered a necessary element of the broadband definition, even though broadband access is typically always-on.

(e.g., server farms, hard-drives, RW-DVDs) and higher-bandwidth applications spread (video email, video telephony), broadband will be continuously redefined at higher speeds. At some point, we will no doubt distinguish the first generation of broadband access from the next generation.

According to this definition, one analyst estimates that about 10% of American households (10.85 million households, by end of 2001) use broadband access to the Internet and other networks (e.g., enterprise LANs for work-at-home). Of those with broadband access, 58% are using cable modem, 37% are using DSL, and 5% are using another technology (wireless, satellite). Penetration rates are expected to increase rapidly, to 35%, or 41 million households by 2005, with market shares of 53% cable modem, 35% DSL, 9% satellite and 3% optical.[9] Other estimates of broadband access penetration and modal shares are shown in Table 1.

Consistent with the focus of the NTIA notice, the measurements in Table 1 focuses on broadband access services for the mass market. It does not include the wide range of broadband access available to large businesses. Large businesses use high capacity services whose speeds can far exceed current cable modem and DSL speeds. These services (ranging from DS-1 to OC3+) are available through multiple competitors in urban areas throughout the country.[10]

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9 "Optical Access, Part II," CIBC World Markets, October 23, 2001, p. 9. (Hereinafter "CIBC.")

10 See for example, "An Analysis of Market Power in the Provision of High-Capacity Access in the Chicago LATA in Support of Ameritech's Petition for Section 10 Forbearance," Dr. Debra J. Aron, Petition of Ameritech for Forbearance from Dominant Carrier Regulation of its Provision of High Capacity Services in the Chicago LATA, CC Docket No. 99-65, March 31, 1999.

Table 1: Estimates of U.S. Broadband Access Penetration Rates and Modal Shares

Investment Firm	Broadband Subscribers, 2000	Broadband Subscribers, 2005
BMO Nesbitt Burns[11]	Cable modem: 70% DSL: 30% Other: excluded	Cable modem: 63% DSL: 37% Other: excluded
Jefferies & Company[12]	Cable modem: 61% DSL: 37% Other: 2%	Cable modem: 47% DSL: 44% Other: 9%
Salomon SmithBarney[13]	Cable modem: 71% DSL: 29% Other: 0%	Cable modem: 59% DSL: 34% Other: 7%
Lehman Brothers[14]	Cable modem: 67% DSL: 33% Other: excluded	Cable modem: 64% DSL: 36% Other: excluded

2.2 Broadband and Wireless Networks

Although many observers focus on broadband access over wireline networks—cable and DSL—there is every reason to believe that broadband access will also be realized over upgraded existing and newly built wireless networks as well. This has enormous implications for public policy: it means that (1) rational spectrum allocation and use policies are critical; and (2) policies that facilitate intermodal competition between wireline and wireless networks will best promote innovation and investment in broadband access facilities.

There are three major classes of wireless broadband access networks emerging: mobile, fixed and satellite. Like wireless telephone networks, both cellular and PCS mobile telephone networks were built for voice communications. The original cellular networks were analog (1G), and have been or are being converted to digital (2G), while PCS networks were digital from the start. In both cases, though, mobile networks have had only limited data capabilities, as anyone who has tried to use a mobile phone for Internet access well knows. There are two significant

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11 "Residential High Speed Internet Access," BMO Nesbitt Burns, October 15, 2001, pp. 13-14. (Hereinafter "BMO Nesbitt Burns.")

12 "DSL Equipment Industry Report, Broadband Access – When will the DSL Equipment Market Recover?" Jefferies & Company, Inc., September 2001, pp. 25-26. (Hereinafter, "Jefferies & Company, Inc.")

13 "Telecommunications Services, The Battle for the High-Speed Data Subscriber: Cable vs. DSL," Salomon Smith Barney, August 20, 2001, p. 1 and p. 7. (Hereinafter "SSB.")

14 "Consumer Broadband – Cable vs. DSL Chapter 2," Cable Communications Services, Lehman Brothers, p. 7. (Hereinafter "Lehman Brothers.")

developments, though, that will change this markedly, namely 2.5G (general packet radio services, or GPRS) and 3G broadband digital data networks.

GPRS has already been deployed in Europe:

> "The number of always-on mobile Internet users in Western Europe will grow to 110 million in 2006, from just a few million this year… One in three Western Europeans will use the latest mobile phone services technology… Business travelers will be the first to use the faster always-on connections that are offered by GPRS packet-switched technology."[15]

GPRS services will soon be offered in the U.S., followed soon thereafter by 3G:

> "In the United States, carriers have been given the flexibility to choose which technology to use to deploy voice, as well as advanced mobile data, services. The two largest mobile telephone carriers that currently use CDMA as their 2G technology, Verizon Wireless and Sprint PCS, announced in early 2001 that they plan to roll out cdma2000 1X as the first phase of their 3G technology rollout during 2001…The major GSM and TDMA carriers in the United States, AT&T Wireless, VoiceStream, and Cingular Wireless, are taking a different migration path to 3G technology. All three carriers plan to deploy GPRS technology during 2001,which is expected to raise data transfer speeds to between 25 and 144 kbps."[16]

Moreover, a new class of service provider is emerging for mobile broadband access, those deploying wireless local area network (WLAN) technology:

> "Fast access to the Internet, at speeds 100 times greater than over a GSM phone, will soon be a reality for mobile workers, according to a new report, from Analysys. Public wireless local area network (WLAN) services enable users to connect laptops and PDAs to their Internet service providers or company intranets at speeds of up to 11Mbit/s… such services are now becoming available at airports, hotels and cafes in countries such as Austria, Germany, Norway and Sweden."[17]

In addition to mobile wireless networks, there will be major developments in fixed wireless technologies for broadband access, using a host of alternatives, including LMDS, MMDS and WCS. Even though initial efforts in fixed wireless were not successful, there is growing evidence that further technological advances are in the offing:

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[15] "Study Sees 110 Million European Mobile Web Users by '02," Reuters, London, December 12, 2001.

[16] Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, 6th Report, Federal Communications Commission, FCC 01-192, Released July 17, 2001, p. 49.

[17] "20 Million Wireless LAN Users in Europe by 2006," Businesswire, November 26, 2001.

> "…there are currently over 210,000 subscribers to broadband fixed wireless services throughout the world, including both enterprise and residential customers. While the [Broadband Fixed Wireless Access] BFWA market has suffered somewhat, by 2005 service provider revenues from BFWA are expected to increase by 10 times its current level….'By circumventing the costs and time associated with laying expensive fiber, broadband fixed wireless technology offers an excellent means by which to capitalize on the vast potential of the broadband market,' said Becky Diercks, director of In-Stat's Wireless Group."[18]

> "Wireless broadband operator Tele2 is close to achieving its planned target of 45 percent population coverage of the U.K. by the end of the year, and is also aiming for 65 percent coverage by the end of 2003. The carrier… offers wireless broadband services at a range of up to nine miles from a base station, at speeds of up to 2 megabits per second (Mbps)."[19]

> "There is a growing opportunity for next-gen, fixed-wireless equipment vendors to quickly gain market share… Sprint and AT&T both recently put residential and small-business fixed wireless initiatives on hold due to difficulties with developing a viable business model. This has provided next-gen vendors with an opportunity to meet a rising demand for these solutions, thus establishing market leadership."[20]

In addition to these terrestrial wireless developments, satellite communications service providers (e.g., DirectPC) now offer Internet access and pending network upgrades will substantially improve the quality of broadband access and services. For example, Hughes Network Services plans to have its "Spaceway" system operating in 18 months. The system will consist of three satellites providing coverage in North America and delivering high-bandwidth services to residential and business customers.[21] Industry analysts believe that "Satellite offerings should become increasingly visible over the next 12-18 months, at first competing effectively in markets underserved by cable and xDSL and, over time, as part of a bundled video offer with strong appeal for certain customer segments…."[22]

2.3 Next Generation Broadband

As exciting as these developments in broadband access technologies may be, they are just the first stage. In each of these modes of broadband access, bandwidth will

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[18] "Troubled Times for the Broadband Fixed Wireless Access Market," Cahner's In-Stat Group, June 11, 2001.

[19] "Tele2 Expanding Wireless Broadband Network In U.K," Newsbytes, November 26, 2001.

[20] "The Strategis Group Provides Strong Outlook for Next-Generation Fixed Wireless Technology Vendors," PR Newswire, November 8, 2001.

[21] "Hughes Seeks Applications to Fill Broadband Satellitle Links," Telecommunications Report Daily , Nov. 15, 2001.

[22] "Broadband 2001", JPMorgan H&Q, McKinsey, April 2, 2001, p. 7.

increase substantially, by an order of magnitude over first-generation broadband. Whereas access speeds in the analog access world was measured in tens of kilobits per second (i.e, 9.6-56 kbps), the current generation of broadband access is measured in hundreds of kilobits per second (i.e., 256-1,544 kbps). The next generation of broadband access will be measured in the thousands of kilobits, i.e., megabits. These speeds will be needed to support bandwidth intensive applications such as online gaming, video-on-demand and streaming video.[23]

Until a substantial number of subscribers have adopted first-generation broadband, the development of broadband applications will not develop sufficiently to create the demand for even higher bandwidth access or applications. Given the substantial investment required to implement next-generation services, current adoption is critically important. For example, one analyst estimates that the cost to implement fiber-to-the-home, which will pave the way for next-generation applications offered by the ILEC's, will be approximately $5,000 per subscriber assuming a 50% penetration rate. This estimate increases to over $9,000 if the penetration is 25%.[24] Thus, it is crucial to adopt and implement public policies that clear away the regulatory obstacles and disincentives that are inhibiting innovation and investment in the current generation of broadband access technologies.

2.4 Implications of Broadband Definition

Defining broadband as digital data access is critical for regulatory policy: it compels us to draw a sharp distinction between voice-grade, dial-up analog circuit and data-rate, always-on, digital packet access, because the worst policy is one that intentionally or unintentionally applies analog voice regulation to the digital data services.

This technology-neutral definition of broadband will promote both intra- and intermodal competition. "The convergent nature of broadband will permit, if not foster, industry convergence and consolidation across traditional industry lines—cable television and telephone services are viewed today as separate markets, but the distinction will make less sense over time. Convergence is a potential enabler of competition…"[25]

Defining broadband as digital data access is also consistent with the NRC's recommendation that "Broadband services should have sufficient performance—and wide enough penetration of service reaching that performance level—to encourage the deployment of new applications."[26] As the NRC notes, this is critical to

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[23] CIBC, p. 9.

[24] CIBC, p. 23-24.

[25] "Broadband Bringing Home the Bits," Committee on Broadband Last Mile Technology, National Research Council, 2001, p. S-3. (Hereinafter "NRC")

[26] NRC, p. S-4.

innovation because network access and applications development are interconnected in "chicken-and-egg" fashion:

> "an application will not be made available until a critical fraction of subscribers receives a high enough level of performance to support it, yet service providers will not deploy higher-performance broadband until there is sufficient demand for it. The performance of a broadband service, therefore, [must] be good enough and improve sufficiently to facilitate this cycle and not impede it."[27]

Thus, investments must be made in broadband deployment now to get a critical mass of broadband subscribers. A critical mass of broadband access subscribers is necessary to justify investment in broadband applications, which in turn generate the demand for next generation broadband access. These critical masses cannot be reached if regulations impede the current deployment of broadband.

3 Primary Policy Goals & Objectives

3.1 Promoting Intermodal Competition

One of the reasons why broadband has such enormous potential for being the engine of the next wave of innovation, productivity and economic growth is that there are so many different technologies for realizing its potential. As acknowledged by the National Research Council report, "popular accounts tend to focus on which technology or players are "ahead" in broadband deployment, broadband is not a horse race between technologies, with an eventual winner."[28] Even so, there is most definitely a race underway among broadband technologies, but there is no finish line to that race; rather, it is a perpetual race and will have multiple winners. In other words, this perpetual technology race among modes of communications that are using and will use competing technologies to provide broadband access to end users, over digitized copper, coaxial or fiber optic cables, or over terrestrial or extraterrestrial wireless networks. The long-term outcome of this perpetual technology race will be diversity in technology options, because of geographic diversity; incremental investments in existing infrastructure; continued exploitation of technology skills across modes; and varying levels of technology maturity.

For this reason, public policies that promote intermodal competition are absolutely crucial to the rapid and widespread deployment of broadband access. The critical policy for promoting intermodal competition is regulatory symmetry, i.e., reducing the regulation of ILEC's, by far the most highly regulated of all intermodal competitors. Promoting intermodal competition would stimulate innovation and investment in existing and new telecom network infrastructures, including telephone, cable, mobile wireless, stationary wireless and satellite.

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27 NRC, p. S-4.

28 NRC, p. S-8.

Experience in surface freight transportation demonstrates the benefits of promoting intermodal competition. Prior to 1980, transport industries were regulated on the basis of modal competition, causing massive inefficiencies (e.g., empty backhauls in trucking, misallocation of traffic by mode) and financial failures (i.e., bankrupt railroads). The Staggers and Motor Carrier Reform Acts of 1980 promoted intermodal competition, leading to enormous gains in efficiency and productivity in freight transportation.[29]

3.2 Promoting Innovation by Adopting Technology Neutrality Policies

FCC Chairman Powell has noted that the Commission needs to work hard to remain "technology agnostic" so that it doesn't promote or discourage the deployment of any broadband technologies over others. Mr. Powell has acknowledged that the FCC "runs the risk" of preferring one technology over another "thereby drying up innovation and investment in a host" of other possible solutions.[30] Unfortunately, both the FCC's and some states' policies appeared to have singled out one class of service providers (ILEC's), and, thereby, the technology they deploy (DSL), for regulation. All other actual and potential providers of broadband access and, thereby, all other broadband access technologies, are virtually unregulated. So, whether intentionally or not, current policies are not remotely technology neutral.

Technology neutrality is an important policy objective because it would promote a rich array of interconnected competing and complementary networks, ensuring the adoption and deployment of appropriate technologies, depending on location, applications and other factors. Neutrality would also promote technology competition to improve existing technologies and develop new ones, including technologies not yet imagined.

Finally, any policy that attempts to mandate deployment of a particular broadband access technology by a particular class of service providers (e.g., DSL by ILEC's) will be counter-productive because it will cause inefficient use of that technology (e.g., wireline over wireless in rural areas) and inhibit technological innovation and the adoption of superior technologies (e.g., requiring DSL deployment specifically will slow the development of wireless broadband access technologies).

3.3 Promoting Investment and Facilities-Based Competition

Facilities-based competition ensures robustness and redundancy and protects against network breakdowns and outages. Thus, one of the key recommendations of the National Research Council is that U.S. broadband "Policies should favor facilities-

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[29] Steven A. Morrison and Clifford Winston, "Regulatory Reform of U.S. Intercity Transportation," Chapter 14 of Essays in Transportation Economics and Policy, Brookings Institution Press, Washington D.C., 1999.

[30] FCC Chairman Michael Powell, speech to Fairfax (Va.) County Chamber of Commerce, November 9, 2001, as reported in Telecommunications Report Daily, Nov. 9, 2001.

based competition over mandated unbundling... Increasing the extent of competition through facilities ownership (and voluntary arrangements to open facilities) rather than relying on regulation that mandates unbundling…"[31]

As the NRC Report emphasizes, policies that promote facilities-based competition, rather than unbundling, have substantial benefits. They (1) reduce the need for persistent regulatory intervention; (2) permit the natural (i.e., competition-shaped) character of broadband service and industry structure to be discerned; (3) promote technological diversity; (4) avoid deterring competitors from investing in their own facilities; (5) remove disincentives to new investment by incumbents; (6) avoid costs and complications of coordination between incumbents and competitors; and (7) facilitate technical optimization of total bandwidth.[32]

So, facilities-based competition should be a high priority policy objective, but it should definitely not be limited to "same technology" or intramodal competition. Given actual and potential developments in broadband access across multiple technologies, we should remove policy obstacles and disincentives to investment in any technology, thereby promoting facilities-based competition across those technologies.

3.4 Promoting Widespread Deployment of Broadband Access

"Universal" broadband access is an important long term objective, but attempts to reach this objective in the short-to intermediate-run by "forcing" deployment, especially if targeted at one class of service providers, will be counter-productive. Rather, widespread broadband access can best be achieved through intermodal, facilities-based competition, which will stimulate the use of appropriate technologies under different circumstances (e.g., cable modems or DSL in cities and suburbs, WLANs on college campuses and office parks, satellite in rural areas).

The worst possible policy would be one that extends the traditional regulatory regime of analog voice communications to data services and broadband access, however noble the motivation may be. Attempting to achieve some kind of "universal broadband service" by regulating one class of service providers–ILEC's–would substantially reduce their incentive to invest in infrastructure. That, in turn, would reduce the rate of infrastructure investment by their intermodal competitors, since a major stimulus for deploying broadband is meeting competition.

Thus, I strongly concur with the NRC recommendation:

> "[Because] Some forms of [government] intervention to expand access... may affect private investment decisions, it should be undertaken with great care in this nascent area in order to avoid unintended consequences."[33] [We should] "defer development of a universal services policy for broadband

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[31] NRC, Recommendation 2.1, p. S-14.

[32] NRC, pp. S-14-15.

> access until the nature of broadband services, pace of development, distribution of access and social significance become clearer."[34]

At the same time, it may be desirable to provide public funding for broadband access in school libraries, senior centers and other public access points, so that individuals without a computer or desire for broadband access at home can gain broadband access in other convenient locations. Promoting broadband access in public places (e.g., schools, libraries, senior centers) through public funding will enable access by lower income or lower use households. Such support is currently being provided through the federal government's e-rate program, which committed nearly $6 billion between 1998 and 2000 to schools and libraries for the implementation of advanced services.[35] Additional targeted government subsidy programs may well be useful in further meeting the need for public broadband access and stimulating demand for development of broadband applications. Any such program, however, should be funded through general revenue sources or, at the least, through a tax that is technology- and competitively-neutral.

3.5 Eliminating Regulatory Obstacles and Disincentives

As noted in the introductory section, there is a large "disconnect" between our policy objectives and our policies toward broadband access. In an age of digital convergence, too many of our policies are geared for a voice world. I agree completely, therefore, with the assessment of the National Research Council:

> "The present policy framework for broadband, which revolves around the Telecommunications Act of 1996, is problematic and unsuited in several respects to the new era of broadband services… the central role of the Internet in the communications landscape was not fully anticipated… the Telecommunications Act of 1996 devotes much of its attention to the voice telephony market and maintains distinct rules for the various communications networks (telephone, cable, cellular, broadcasting, and so on)."[36]

Thus, "problematic and unsuited" regulation is a major inhibitor of investment in broadband access networks. While less regulation is not a policy objective *per se*, it is the best means of achieving other policy objectives. Unfortunately, due to the long history of telephone regulation, and specific provisions of the Telecommunications Act of 1996, there has been a strong tendency to extend regulation from voice-analog services into broadband access services.

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[33] NRC, p. S-13.

[34] NRC, p. S-21.

[35] See "The Schools and Libraries Support Mechanism-2000 Annual Report," http://www.universalservice.org/reports/2000/pg12.asp, downloaded December 14, 2001.

[36] NRC, p. S-12.

Hence, while I agree with the thought underlying the National Research Council's recommendation to "defer new regulation in the early stages,"[37] it is not sufficient to merely defer *new* regulation—it is imperative that we repeal *existing* regulations that have been wrongly applied to broadband access services and—unless removed—will inhibit and distort innovation and investment in broadband access networks and services. Moreover, unless and until we decrease regulatory obstacles to facilities investment and intermodal competition in the current generation of broadband access, we will not get to the next generation of data access (fiber-to-the-home, broadband wireless). Slowing down investment in the current generation of broadband access will impede the development of the next generation.

What is especially harmful about existing regulation is that it is so highly asymmetric: for all practical purposes, only one set of service providers and, hence, one type of broadband technology is regulated, namely ILEC's and DSL broadband access service. Other providers of broadband access are barely regulated, or not at all. That disparity in regulatory treatment of direct competitors in the market for broadband access services distorts competition and technological choices.

In assessing the weight that should be given to reducing regulation of broadband access, it should be noted that regulation is particularly harmful when applied to high technology industries, i.e., those in which technological innovation is the driving force for investment and deployment. Rapid advances in CPUs, PCs and other digital devices occurred because those "markets for innovation" were unconstrained by regulation. As such, chip manufacturers and PC manufacturers had every incentive to produce the fastest technology available. The net result of the competitive market is that consumers can now purchase a variety of PCs for less than $600 that have capabilities that far exceed most business computer systems a decade ago. Given the potential rate of technological change and the dramatic increases in intermodal competition, regulation of broadband services would be especially harmful because of its long-term dynamic effects on the "market for innovation."

4 Disincentives for Investment in Broadband Access

4.1 Promoting Investment in Broadband Access Facilities

As discussed in Section 2, there are many different technologies for providing broadband access, and Section 3 explained why a national broadband policy should be technology neutral and should promote facilities-based intermodal competition. Unfortunately, current policies do neither. Even worse, there is a very real threat of policies—especially state regulation of ILEC's—taking a turn for the worse. The prices for UNE-P (unbundled network elements-platform) are already below cost, but some states are considering lowering them even further. While the FCC has found that packet switching and DSL facilities needs to be unbundled in only limited circumstances, one state has, and other states are considering, requiring additional

[37] NRC, p. A-2.

unbundling of advanced services. So, while public policies should be moving in one direction to achieve broadband policy objectives, they are actually moving in the opposite direction, toward even greater bias against DSL technology and even less incentive for innovation and investment in broadband access. It is imperative that NTIA marshal its resources to reverse this trend.

Unfortunately, there is a strong misperception that regulation is not hindering investment in broadband. Defenders of current regulatory policy cite the enormous investments ILEC's have made in deploying DSL. So, for example, the FCC has argued that:

> "Notwithstanding the fact that the incumbents have been on notice that they could be required to unbundle facilities used to provide advanced services, the incumbents have announced aggressive rollout plans for xDSL service. In fact, a recent financial analyst's report indicates that advanced data services currently comprise an average of 9.9 percent of the revenues of the BOCs and GTE… We find these statistics to be significant because they demonstrate that the development of competition, and the threat of losing revenue and customers to carriers offering advanced services, provides a powerful incentive for carriers to invest.[38]

That is false logic for three main reasons. First, given the clear directive of Section 706 of the Telecom Act, it was reasonable for ILEC's to assume—and make capital budgeting decisions based on that assumption—that regulators would not require mandatory unbundling or TELRIC pricing of DSL equipment. Given recent regulatory developments, particularly at the state level, that is no longer the case.

Second, the initial upgrades from an analog network to a digital network can be made relatively easily and inexpensively. The cost of that upgrade goes up dramatically, however, as one moves to the edges of the network. Thus, the ILEC's have made the less expensive upgrades to provide broadband access on a substantial share of their networks; the question now, though, is whether they have sufficient incentives for the additional investments to push the digital upgrade further out into their networks. Given regulatory indisincentives, that is by no means assured.

Third, there has been a decided shift in capital markets, from emphasizing growth to corporate cash flow and earnings:

> Ernst & Young reports many analysts in the fixed-line telecom market have altered their valuation strategy to focus heavily on free cash flows. Non-financial indicators of growth largely have been discarded as performance

[38] In the Matter of the Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket No. 96-98, Federal Communications Commission, Third Report and Order and Fourth Further Notice of Proposed Rulemaking (FCC 99-238), November 5, 1999, ¶138.

> indicators, and analysts now are focusing on incremental achievements rather than long-term growth projections.[39]

Not surprisingly, this change in financial performance metrics already may be affecting investment:

> "We believe ILECs in general are not being as aggressive as they were last year towards DSL deployment. At the present time, the investment community is focused on EPS and positive cash flow in determining stock valuations rather than growth in subscribers and revenues. In general, it takes two years for an ILEC to become cash flow positive on a DSL subscriber. Hence, slower subscriber growth improves near-term EPS and cash flow."[40]

There can be little doubt that negative regulatory decisions, and growing uncertainty about even more unfavorable regulatory decisions, are harming ILEC investment incentives:

> "RBOCs… are the major providers of residential high-speed Internet access via DSL in the U.S… but penetration rates are low relative to cable companies… due to… unfavourable regulatory decisions with respect to wholesale DSL services that continue to inhibit deployment."[41]

> "Cable modem's advantage today is that it does not have to share or un-bundle its networks as do the ILECs. Lack of regulation provides a clear advantage [for cable] in service deployment."[42]

> "While regulatory developments continue [to] favor cable MSOs, the constraints on RBOCs are increasing. Line sharing with other competitive local exchange carriers (CLECs) has been required for the Bells… Moreover, the establishment of separate subsidiaries for DSL operations has been required."[43]

Even if investment disincentives only reduce investment at the margin, they can substantially slow deployment and adoption because of the effect on (1) competitive dynamics and (2) network interdependencies between broadband availability and applications development ("the chicken and egg problem"). Thus, in the remainder of this section, we will review the disincentive effects of specific regulatory policies that

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39 "Analysts have altered their valuation strategy to focus heavily on free cash flows," TelecommNOW News Daily 11/30/2001.

40 Jefferies & Company, p. 36.

41 BMO Nesbitt Burns, p. 5.

42 Jefferies & Company, Inc., p. 14.

43 SSB, p. 3.

are hampering investment in broadband access and must be changed to realize our national policy objectives.

4.2 Disincentive Effects of Regulated Rates for Interconnection, Resale & UNE's

As a theoretical proposition, setting prices of unbundled network elements (UNEs) at TELRIC can facilitate entry and promote investment in facilities-based competition. As a practical matter, it has done anything but that. The predominant use of TELRIC has NOT been in the pricing of UNEs, but in the pricing of UNE-P, which has nothing to do with unbundling and everything to do with providing a wholesale price arbitrage opportunity for entrants. Consequently, UNE-P has become a major impediment to infrastructure investment and facilities-based competition.

As applied by state commissions, TELRIC costs have been systematically under-estimated (see 4.3.), so UNE prices are typically well below true economic costs. The problem has been exacerbated by numerous "compromises" in which ILEC's "voluntarily" lower UNE prices to gain regulatory approval on unrelated matters (e.g., merger or §271 approval). Moreover, because some states have set UNE prices even further below costs than others, there is a growing tendency to hold up the lowest UNE prices in an ILEC region as the standard for UNE prices in other states, which only spreads and increases the harm of poor regulatory decisions.

Thus, the financial evidence indicates that UNE prices are below cost, in fact, "UNE prices are at a deep discount to Regional Bell's costs, as reflected on their financial statements."[44] If the trend toward lower UNE prices, and more extensive unbundling requirements continues (e.g., DSL unbundling), the harm will grow exponentially: ILEC's will not be able to tolerate the much larger losses (due to UNE prices below costs) if the quantity purchased increases substantially.[45]

If ILEC losses due to higher "sales" of UNE-P at prices below costs, that will assuredly reduce their incentives and ability to attract capital to invest in network upgrades, including broadband. Moreover, pricing UNE-P below costs reduces incentives for all infrastructure owners to invest, by setting an artificially low "cost" for non-facilities based competitors. An MSO considering investments in plant upgrades to provide cable telephony faces competition from a CLEC or reseller using UNE-P, which reduces expected revenues and therefore makes the investment that much less likely.

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[44] "Status and Implications of UNE-Platform in Regional Bell Markets," Kovacs et al, Commerce Capital Markets Equity Research, November 12, 2001, p. 1. (Hereinafter "Kovacs et al.")

[45] Kovacs et al, p. 1.

4.3 Disincentive Effects of TELRIC

To the extent that TELRIC provides an accurate estimate of the actual economic cost of building a network, and to the extent that TELRIC-based prices provide for recovery of ACTUAL costs, TELRIC is a useful tool for establishing UNE prices. In many jurisdictions, though, TELRIC has not been implemented in a way that fully compensates ILEC's for their costs. TELRIC estimates are based on complex cost models with a large number of assumptions and inputs. Unrealistic and inconsistent assumptions and inputs have resulted in unrealistically low TELRIC estimates.

There is also a fundamental flaw in the application of TELRIC costs in determining UNE prices (in addition to the biases below). Even though the TELRIC cost models adopted by most states use excessively long depreciation periods, there is typically no requirement that competitors make commitments on the duration of their UNE purchases. So, an ILEC may have to make very long-term investment commitments to provide UNE's to CLEC's, but the CLEC's can buy those UNE's for a short period of time, then switch over to their own facilities (or lease facilities from another CLEC), stranding the ILEC's investment.

But the biggest problem with TELRIC pricing is that, even if it is conceptually sound for pricing network elements, it is not being used mainly for that purpose: its main application is in the pricing of network services—UNE-P—for which it is not intended and for which it is conceptually wrong. The Telecom Act provided two different pricing mechanisms for good reason: a resale discount is the appropriate method for pricing services; correctly estimated TELRIC is correct for pricing elements.

> "UNEP is physically similar to resale. In each case, the CLEC uses the ILEC network to provide service to the end-user and essentially limits its own functions to marketing, inputting the order into the ILEC's systems, and billing."[46]
>
> "UNEP can be more economic, where the customer's retail bill is high enough. Thus, CLEC's have generally preferred UNEP to resale as an entry mechanism, where they have felt entry was economic at all. But they have generally limited themselves to targeting states in which UNEP prices are low and then cherry-picking customers within those states."[47]

Not surprisingly, local competitors are now arguing that state commissions should mandate unbundling even where the FCC does not. In Texas, for example, CLEC's and resellers have petitioned the PUC to mandate unbundling of local switching in major metropolitan areas, even though the FCC has found that it is not required. It is ironic that competitors seek "unbundling" when they are not even buying <u>unbundled</u>

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[46] Kovacs et al, p. 2.

[47] Kovacs et al, p. 2.

switching. Rather, they seek to maintain the existing price arbitrage opportunity, of having both a resale discount and a UNE-P wholesale price available.

In addition, those same applicants are attempting to ratchet down the UNE-P price by recalculating TELRIC, based on the premise that the costs of "best available technology" have decreased since the currently used TELRIC costs were estimated. But it is completely inappropriate to periodically reapply TELRIC as they request. As estimated in Texas and every other jurisdiction, TELRIC is based on the unrealistic assumption that the entire incumbent network is replaced with a single-vintage of best available technology. Reapplying TELRIC every few years is directly at odds with that assumption and the long depreciation lives used in previous TELRIC estimates.

Because telecom is a network industry characterized by large-scale durable assets and rapid technological change, re-applying TELRIC periodically would put TELRIC on a declining cost trajectory that is not achievable, chilling investments from all providers. That downward spiral would have a disastrous effect: "If [there were] radical reductions in the price of UNE-P, two things would happen. CLEC's would find UNE-P entry economic and would begin to enter the market very actively. The RBOC's, in turn, would quickly become uneconomic, as they would be forced to serve customers at prices that are at an 80%-90% discount from the cost on their financial books."[48]

It would be even more inappropriate to apply TELRIC to new investments used to provide new network capability, such as broadband. By its nature, unbundling reduces incentives for investment, but that disincentive effect is increased exponentially when rapid technological change can cause early technological obsolescence.[49] Consider the effect of requiring Intel to unbundle its manufacturing plants and price those unbundled elements at TELRIC. Even worse, imagine requiring Intel to sell its Pentium 4 chips to its competitors at downward-biased TELRIC prices—which is the correct analogy to UNE-P pricing of DSL. Can anyone imagine that Intel would continue to spend such a large share of its revenues on R&D, or make even riskier investments in new semiconductor manufacturing facilities? Of course not.

4.4 Disincentive Effects of Uncertainty of Investment Returns

As a matter of economic principles and empirical observation, there can be no doubt that increasing the risks and uncertainties associated with investments decreases incentives to invest. This is especially true of large-scale investments in durable assets, such as investments to extend DSL capabilities into wireline networks.

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[48] Kovacs et al, p. 7.

[49] Early technological obsolescence occurs when the economic life of an asset is less than its physical life, due to rapid technological change.

Even without required unbundling, there is a great deal of risk associated with the substantial investments required to extend and enhance broadband availability (estimated at over $10 billion[50]). These risks stem from both the supply and demand side of the business. For example, on the supply side, ILEC's face challenges in conditioning lines, deploying equipment in outside plant, and managing customer acquisition costs.[51] On the demand side, ILEC's face risks associated with customer take-rates, customer churn and price stability. These "normal" risks of providing broadband service are reflected in the fact that at approximately 30% of broadband subscribers, DSL is significantly behind cable modem service in market penetration.

Adding regulatory requirements that increase the cost for the incumbent and/or artificially reduce the cost to competitors will dampen ILEC investment in DSL facilities. Even minimal unbundling requirements increase risk and uncertainty increases, making DSL investments less attractive. Extensive unbundling dramatically decreases ILEC control over its assets and increases the degree of uncertainty associated with its investments. Many technical and operational risks associated with the unbundling of DSL facilities were articulated by SBC in a recent proceeding in Illinois including: (1) premature exhaustion of bandwidth of the Next Generation Digital Loop Carrier (NGDLC) and line card slots in remote terminals (RTs), (2) additional cost associated with provisioning and maintaining the line cards in the RTs, and (3) additional costs associated with coordination among carriers in the repair and maintenance processes.[52] These risks increase capital costs and operating expenses, and could affect an ILEC's ability to provide service to its end users.

In addition to capital budgeting effects, as reflected in company business case analysis, regulations disincent investments more generally through capital market effects. The willingness of investors to buy debt or equity in companies that are investing in long-lived assets—as required to build broadband access networks – depends critically upon their expectations of future returns. By preventing firms from earning adequate risk-adjusted rates of return—or merely through uncertainty about what regulations will apply in the future—those expectations are reduced, and the cost of capital increases and/or less capital is available to the firm for investment. Today, ILEC's are facing pressure from capital markets, which is causing them to slow down DSL deployment.

> "We believe ILEC's in general are not being as aggressive as they were last year towards DSL deployment. At the present time, the investment community is focused on EPS and positive cash flow in determining stock valuations rather than growth in subscribers and revenues. In general, it takes two years for an ILEC to become cash flow positive on a DSL

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[50] Lehman Brothers, p. 3.

[51] BMO Nesbitt Burns, p. 36.

[52] Covad Communications Company Petition for Arbitration Pursuant to Section 252(b) of the Telecommunications Act of 1996 to Establish an Amendment for Line Sharing to the Interconnection Agreement with Illinois Bell Telephone Company d/b/a Ameritech Illinois, and for an Expedited Arbitration Award on Certain Core Issues; Rhythms Links, Inc., Illinois Commerce Commission, Opinion, February 15, 2001.

> subscriber. Hence, slower subscriber growth improves near-term EPS and cash flow."[53]

The disincentive effects of existing regulatory policies are just one part of the problem; investment outlooks must also factor in uncertainty about future regulations, including regulatory "re-contracting." Thus, an FCC decision to exclude DSL line cards from unbundling requirements does not necessarily eliminate uncertainty on that point, so long as the regulatory regime leaves open the possibility that such unbundling might be required in the future.

> "Widespread deployment of DSL has been slow to develop due to a combination of factors, including…state government legislation in the U.S. that may require the ILECs to unbundle DSL, further reducing the economics…"[54]

> "Looking ahead, DSL penetration is expected to remain higher in Canada [due to]… increased regulatory uncertainty in the U.S. with respect to DSL line sharing. For example, despite a recent U.S. FCC ruling that DSL services provided by the ILECs are not required to be unbundled into their various elements, some states have introduced legislation that may require the ILECs to do so. This has the potential to reduce DSL economics of these areas. Cable companies are not required to provide network access to the third parties at this time."[55]

Unfortunately, regulators, such as the Illinois Commerce Commission (ICC), have greatly heightened broadband investment uncertainty by decisions or suggestions that they may compel extensive unbundling of DSL facilities. As explained by SBC in reference to the Illinois Arbitration Decision on Rehearing,

> "The recent ICC decisions concern Ameritech's plans to expand the availability of high-speed DSL through a network of remote terminals (Project Pronto). The decisions established conditions under which the terminals must be deployed. Complying with the ICC's decisions could cost SBC more than one-half billion dollars, making the DSL product uneconomical for both Ameritech and its competitors. In addition, the decisions are technologically unfeasible, as they exceed the space capacity and technical requirements of broadband remote terminals."[56]

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[53] Jefferies & Company, Inc., p. 36.

[54] BMO Nesbitt Burns, p. 36.

[55] BMO Nesbitt Burns, p. 20.

[56] "Ameritech Requests ICC Rehearing to Expand Broadband Access in Illinois," *Ameritech Press Release*, April 13, 2001, http://www.ameritech.com/content/0,3086,196-20010413-01,00.html.

> "'We have shut down Project Pronto in Illinois,' he said [James Shelly, president of external affairs for Ameritech], noting that the company would continue to add customers where DSL is already available, but that it also has halted mass marketing in Illinois."[57]
>
> In a letter to Congress, SBC chairman and CEO Ed Whitacre warned the ICC decision would cost "hundreds of millions" to implement and would slow the deployment of broadband services to consumers.[58]

While the ICC revised its original decision requiring extensive unbundling of SBC's Project Pronto network, its decisions greatly heightened uncertainty associated with ILEC broadband investment.

Perhaps the most serious long-term effect of such regulatory barriers and disincentives to infrastructure investment is on the rate of technological change. The "dynamic" effects of poor public policies can well dwarf the "static" effects, even though they may be less observable. If facilities-based service providers invest less in network upgrades due to an unacceptable level of uncertainty over returns on that investment, that means that equipment vendors will make fewer sales and invest less in R&D, thereby slowing the rate of technological change.[59] Thus, regulatory decisions—however well-intentioned—can cast a wide and long shadow over investment in broadband access, thereby reducing the rate of productivity gains and economic growth.

4.5 Disincentive Effects of Retail Price Regulations

The continuing regulation of basic exchange services has held retail prices below costs in many cases. Thus, regulated rate structures bias and distort not only consumer choices, but also investment decision by facilities-based providers:

> "Retail prices are not based on costs that are relevant to any particular customer class. Actually and perversely, they are set counter to the costs relevant to particular customer classes. High-cost residential customers receive low-priced service. Low-cost business customers receive high-priced service. This is hardly news—everyone who deals with telecommunications is aware of the cross-subsidies that are embedded in the system." [Regulators face a dilemma]. "If they continue to ratchet down UNEP prices to the point that they become attractive to the CLECs, they will be forcing

[57] "Ameritech halts DSL upgrades; Project Pronto shut down in dispute with ICC concerning use of network," *The State Journal-Register*, March 30, 2001.

[58] Id.

[59] Harris, Robert G., "R&D Expenditures by the Bell Operating Companies: A Comparative Assessment," invited paper, Twenty-Third Annual Conference, Michigan State University Institute of Public Utilities, Williamsburg, Virginia, December 9, 1991; MSU Public Utility Conference Proceedings, 1993.

> RBOCs to wholesale their network at rates that are significantly below the costs that the financial community looks at."[60]

Rate restructuring, which is the obvious economic solution to this problem is not politically viable in most states.[61] Retail rates structures that are misaligned with costs disincents investment in telecom infrastructure, NOT ONLY by ILEC's, but also by CLEC's, MSO's and mobile carriers and other facilities-based service providers. Mobile carriers would compete even more directly with ILEC's for local exchange services, but facing wireline basic rates below cost reduces carriers' incentive to expand mobile network capacity to improve their capacity and quality of service in homes or to invest in network upgrades to provide wireless internet access. Likewise, MSO's can compete directly with ILEC's in basic exchange services, but an MSO considering investment to upgrade plant to provide cable telephony faces artificially low retail prices that an ILEC is required to charge.

As relates to broadband, this presents an enormous barrier to consumer adoption of broadband and, therefore, the expected returns on investment in broadband access facilities. Under retail rate regulation, customers face a biased choice between dial-up Internet access (with unlimited local calling) and broadband access, by DSL, cable modem, satellite, fixed wireless or any other means.

> "Dial up Internet services will continue to be the primary source for residential high-speed Internet subscribers, particularly as pricing for low-speed unlimited access remains at a substantial discount."[62]

This biased choice reduces broadband take rates, which reduces returns on and incentives for investments in broadband access. Because of the "chicken and egg" relationship between broadband access and broadband applications development, slower consumer adoption rates on access slows applications, which further distorts the choice between narrowband and broadband access. In order to achieve our national policy objectives of rapid, widespread deployment of broadband access and applications, we will have to remove—or at least reduce—the magnitude of this distortion.

5 Regulatory Policies for Broadband Access & Services

The nation faces a crucial choice. There is a major "disconnect" between our public policies and our policy objectives, namely to promote the rapid deployment and adoption of broadband access and achieve the economic, social and technological benefits of the "next wave" of the information society. The current regulatory regime is highly asymmetrical among classes of service providers and, therefore, is not

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[60] Kovacs et al, p. 6.

[61] Kovacs et al, p. 1.

[62] BMO Nesbitt Burns, p. 10.

technology neutral. Current regulations—and the threat of even more onerous regulations—substantially reduce incentives for investment in broadband infrastructure. To achieve our public policy goals and objectives, we must change our regulatory policies toward broadband access. Moreover, current regulations are inhibiting and distorting intermodal competition, which is completely contrary to the nation's long-run interests in widespread broadband networks and services. Thus, I fully concur with the NRC's recommendation that we should:

> "Structure regulation to emphasize facilities-based competition and encourage new entrants… The policy goal, simply put, should be to increase the extent of competition through facilities ownership (and voluntary business arrangements to open facilities) rather than through long-term reliance on mandated unbundling."[63]

The best policy to promote rapid technological innovation and investment in broadband access and services is to allow market forces–technology competition and intermodal competition–to determine the course of development and deployment. To achieve our national policy objectives and the potential benefits of the digital revolution, it is imperative that we at least reduce the completely different regulatory treatment of ILEC's versus other broadband access providers. The most heavily regulated providers of advanced services today are the Regional Bell Operating Companies (RBOC's). RBOC's are subjected to a whole host of the regulatory obligations that are not applied to any of the their competitors in the market for broadband access:

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[63] NRC, p. A-2.

- RBOC's must allow competitors to collocate on their premises;
- RBOC's must, under certain circumstances, unbundle their network for competitors to use to provide broadband;[64]
- RBOC's must allow access to the loop facilities on a shared basis with their competitors;
- RBOC's are prohibited from providing broadband across LATA boundaries until they receive FCC 271 approval to provide voice services across these boundaries.

In addition, some RBOC's are subjected to other regulatory requirements imposed by state regulators under varying state laws or varying interpretations of the Telecom Act or FCC decisions pursuant to the Act. Some RBOC's are also subject to regulatory requirements that have been imposed through regulatory decisions that are unrelated to broadband policy, such as merger and 271 applications (e.g., separate affiliate requirements on advanced services).

Even when the FCC has limited ILEC regulations in their application to broadband facilities or services, states have sometimes gone beyond. Yet, several states have dramatically increased uncertainty by requiring (or indicating that they may require) unbundling of broadband facilities (e.g., packet switching) even after the FCC decided that

[64] The Commission established certain circumstances when an ILEC must unbundle its packet switching network elements including the digital subscriber line access multiplexer ("DSLAM"). The test to determine when unbundling must occur is set forth in ¶313 of the UNE Remand Order. See In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, CC Docket No. 96-98, 15 FCC Rcd 3696 (1999). (Hereinafter, "UNE Remand Order.")

> "Incumbent LECs are not required to unbundle packet switching, except in a limited circumstance. Competitive LECs are actively deploying packet switches to serve high-volume customers, and are not impaired in their ability to offer service to such customers without access to the incumbent LEC's facilities. Competitive LECs are impaired, however, in their ability to provide services to small-volume users without access to unbundled packet switching. Nonetheless, we consider the other goals of the Act in making our unbundling determination, and conclude that give the nascent nature of the advanced services market and the Act's goal to provide incentives to all carriers to invest and innovate, incumbent LECs are generally not required to unbundle packet switching."[65]

In spite of this well-founded reasoning, the Illinois Commerce Commission earlier this year ordered SBC to unbundled packet switching, and other states are considering doing so as well. While the ICC modified its decision several months later, there is no question that increased uncertainty caused by these decisions casts a pall on ILEC broadband investments. Moreover, these decisions have enormous negative spillovers to other states and the nation as a whole. By acting in a manner contrary to investment and intermodal competition in broadband access, individual states can reduce the rate at which broadband access and applications develop.

It has been historically demonstrated that adopting policies to substantially reduce regulatory asymmetry between intermodal competitors can generate substantial public benefits. As I wrote just prior to the Telecommunications Act of 1996:

> Through the lens of history, we will see the basic similarity between the emergence of competition in telecommunications on the one hand and freight transportation and financial services on the other. In both cases, regulators were slow to recognize the development of competition from new modes of transportation (motor carriers competing with rail carriers) and financial services (diversified financial service firms like Merrill-Lynch competing with banks). Like LECs, the incumbent railroads and banks were regulated very differently from their competitors, who exploited regulatory asymmetries and sought to maintain their competitive advantage through public policy advocacy. Consequently, in both industries, public policies lagged behind changes in the marketplace, with regulatory asymmetries causing economic harm to the incumbent service providers, to their customers, and to the economy as a whole. As evidence of the economic harm, induced inefficiencies, and financial failures of incumbents increased, policymakers finally responded by reducing or eliminating regulatory asymmetries between incumbents and their competitors. Both industries benefited as regulations became more symmetric. Just as the poor performance of these industries under traditional regulatory regime illustrates the economic costs of regulatory asymmetry, the substantial improvements in industry performance

[65] UNE Remand Order, Executive Summary, p. 14.

following regulatory reform illustrate the economic benefits of regulatory symmetry.[66]

As noted at the outset of this paper, Section 706 of the Telecom Act clearly directs the Federal Communications Commission to remove regulatory obstacles that inhibit broadband investment and competition. Fortunately, the Act provides a means of moving substantially in this direction. Section 10(a) of the Act of 1996 directs the Commission to forbear from any regulation (1) that is not necessary to ensure that charges, practices, classifications, or regulations by, for, or in connection with a carrier or service is just and reasonable; (2) enforcement of the regulation is not necessary for the protection of consumers; and (3) forbearance is the public interest.

The key empirical determination in implementing this legislative provision is a finding that ILEC's are "non-dominant" in the market for broadband access and services. Of that there can be no doubt. There are many modes of providing broadband access and even more on technological horizon. The DSL broadband access technology being deployed by ILEC's has a lower share of the market than cable modems. Deployment of new broadband access technologies by satellite, 3G and WLAN service providers will further stimulate intermodal competition.

Indeed, as a matter of economic policy, Section 10 of the Act requires that all broadband access service providers be treated the same. As no provider of broadband access is a "dominant carrier," then any regulation of broadband access service must apply to all technologies and all classes of service provider. In other words, rules imposed on ILEC's must also be imposed on competitors. But it would make no sense to regulate <u>all</u> broadband access providers. The only rational implementation of Section 10 is non-dominant regulation, the elimination of broadband UNEs and forbearance on pricing.

Hence, the NTIA should urge the Commission to declare that no carrier is "dominant" in the provision of broadband services and to forbear from regulating those services. The NTIA should also advocate that the Commission use the necessary and impair standard of § 251(d) to find that the unbundling of broadband facilities—specifically, Line Sharing[67] and Line Splitting[68] —is not necessary and is contrary to the public

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[66] Harris, Robert G., "Toward Regulatory Symmetry in Local Exchange Services: Lessons from Financial Services and Freight Transportation," presented to the Industrial Organization Society, San Francisco, January 5, 1996, pp. 3-4.

[67] In the Matters of Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket Nos. 98-147 and 96-98, Third Report and Order in CC Docket No. 98-147 and Fourth Report and Order in CC Docket No. 96-98, 14 FCC Rcd 20912 (1999) ("Line Sharing Order").

[68] In the Matter of Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket Nos. 98-147 and 96-98, Third Report and Order on Reconsideration in CC

interest. Implementation of these changes will go a long way toward equalizing competition in the broadband market.[69]

Regulatory forbearance of broadband should also apply to all services provided over it. If the nation wants to promote digital convergence and the co-development of broadband access and applications, it is imperative that policies do not distinguish among—much less discriminate against—broadband service providers based on "legacy" considerations. Specifically, this means that voice services provided over broadband access networks should not be regulated merely because voice service has traditionally been regulated.

Given recent decisions by state regulators, the NTIA should encourage the FCC to employ the clearest and strongest possible language in articulating the empirical support and reasoning for these decisions. Given the dual jurisdiction of telecommunications regulation, the FCC cannot prevent the states from making decisions that are contrary to the national interest. But both the NTIA and the FCC can make clear the national interest in removing regulatory obstacles and increasing incentives for innovation and investment in broadband access and applications.

6 Other Public Policies to Promote Broadband Deployment

6.1 Promoting Broadband through Tax Policies

Federal, state and local tax policies can work together as a disincentive or a barrier to broadband deployment. The decision as to where and when broadband services are deployed are influenced by the tax structure. As in any business, the decision is based on cost associated with the expected revenue stream.

Broadband deployment is limited by imposing: 1) a heavy tax burden on telecommunications companies, driving up the cost to build out advanced infrastructure, and 2) a heavy tax burden on the broadband services that are sold, driving up the price and limiting the available revenue stream to support the build out. Examples of heavy tax on the cost to build out advanced infrastructure are long depreciation lives that do not reflect technological changes (including the risk of obsolescence) occurring in the industry and, in some states, tax assessment ratios that are much higher than those for general business property. Examples of heavy tax burdens on broadband service revenues include gross receipts taxes, franchise fees and higher than general sales tax rates imposed on the services.

Docket No. 98-147, Fourth Report and Order on Reconsideration in CC Docket No. 96-98, 16 FCC Rcd 2101 (2001) ("Line Splitting Order").

[69] Non-dominant forbearance of ILEC's broadband services would reduce, but not eliminate regulatory asymmetry. For example, ILEC's provide "open access" over their broadband access services (i.e., consumers can choose a different ISP), whereas most other broadband access providers do not (i.e., they only offer a bundled service of broadband and Internet access).

Tax policy should also be structured to be competitively neutral, which is not always the case. Cable provides a competing service to ADSL yet state and local governments tax the equivalent competing services differently. Converging industries/services should all be taxed the same to allow the free market to operate effectively and efficiently.

In addition, there are only a limited number of states that offer incentives to build out the advanced infrastructure. The old economy was built on manufacturing, and states recognized the benefits of giving investment tax credits and/or exempt the purchase of the equipment used to produce taxable goods. The new economy is built on the free flow of information. Yet there are only a limited number of states that provide investment tax credits or exempt the purchase of infrastructure equipment used by telecommunications companies to provide taxable services. The concept of government partnering with the manufacturing industry to drive the old economy has not been widely embraced to build up the new economy's infrastructure – telecommunications.

The National Conference of State Legislatures (NCSL) has been studying e-commerce taxation, including the taxation of telecommunications services, for nearly two years, and progress has been made by the various state legislatures updating their tax laws. Florida, for example, has made great strides by replacing their state and local gross receipts taxes on telecommunications services with a statewide excise tax on all communications services (including cable). However, Florida's new combined state and local tax rate on communications is still almost double the general business sales tax rate. In summary, efforts to deploy advanced broadband services continue to be stifled by federal, state and local tax policies.

6.2 Promoting Broadband through Right-of-Way (ROW) Policies

Public rights-of-way are essential for the development of a municipality that is capable of providing benefits to its residential and business members. Just as rights-of-way on top of streets and highways are used for conveyance of people, goods, and services, rights-of-way below and beside streets and highways are used for the conveyance of water, electricity, cable, and telecommunications. Cities are charged with the responsibility of managing the rights-of-way for the benefit of businesses and residents in their jurisdictions. Certainly, the public utility corridor and the facilities in the corridor increase the value of land used for businesses and homes in cities. Without streets for surface traffic, telecommunications, and other utilities, the value of the land and the benefits of living in a city would be greatly diminished.

When telecommunications firms place facilities in the public rights-of-way, cities incur real costs related to managing its rights-of-way. Cities have legitimate interests in avoiding unnecessary disruption caused by the laying of conduit along city rights-of-way and in recovering the costs it will actually incur when firms use its rights-of-way. Cities should address these concerns through an economically rational mechanism. Section 253(c) of the Telecommunications Act provides that state and local governments can “require fair and reasonable compensation from telecommunications providers, on a competitively neutral and nondiscriminatory basis, for use of public rights-of-way on a nondiscriminatory basis.”[70] The only interpretation of fair and reasonable that promotes efficient competition is fees designed to recover the costs caused by telecommunications companies that use the public rights-of-way. Imposing costs on private firms that are not based on the costs that these firms impose on a city will hamper the abilities of firms to compete on their merits and deliver the benefits of competition.

When telecommunications firms access a municipality’s ROW, the municipality incurs management costs resulting from activities such as issuing permits, reviewing traffic control plans, inspecting construction sites, and updating city maps of utility facilities in the rights-of-way. Fees that exceed the actual costs of managing rights-of-way are an unnecessary burden and represent a substantial barrier to infrastructure investment. Access to the public rights-of-way is necessary for wireline firms to maintain their networks and implement innovative network upgrades. Fees for use of the public rights-of-way that are in excess of costs incurred by municipalities will unnecessarily increase a firm’s costs and decrease the value of entry and expansion, chilling investment. In the worst case, non-cost-based fees will deter network upgrades, facilities-based competition and the benefits of broadband access and applications. Even in the best cases, these costs will be passed on to customers, thereby counteracting the expected benefits from competition.

Fortunately, there is a growing recognition of the need for policy reforms in this area. Assistant Secretary of Commerce Mehlman recently stressed the importance of eliminating roadblocks posed by difficult rights-of-way, franchise fee, and historic preservation rules.[71] At a recent forum sponsored by the Appraisal Institute, it was noted that “increased deployment of fiber lines for broadband and other uses has expedited need for rights-of way (ROW) fee reforms… Without significant changes to ROW policy, telecom businesses are looking at possibly billions of dollars in future expenses from new fees… which can "undermine the credibility of the process and jeopardize the build-out of new infrastructure."[72]

The NTIA should actively encourage and participate in efforts to remove these obstacles to infrastructure investment. It can foster efficient investment and innovation by working to establish guidelines for ROW fees based on actual costs and support legislation to enforce those guidelines by, for example, withholding federal subsidies to those cities not in compliance.

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[70] TA96, Section 253 (c).

[71] See Bruce Mehlman, Competitive Policy Institute.

[72] “U.S. Needs to Reform Right-of-Way Policies, Officials Say,” TELECOM A.M., Vol. 7, No. 235, December 6, 2001.

Attachment A
Biography of Professor Robert G. Harris

Robert G. Harris is Professor Emeritus and former Chair of the Business and Public Policy Group at the Haas School of Business, University of California at Berkeley, and a Director at LECG, LLC. He has published more than 50 articles on antitrust, regulation, telecommunications, and transportation and has testified before Congress, the Federal Communications Commission, the Department of Justice, the Canadian Radio-TV Commission, and 27 state regulatory commissions on competition, interconnection pricing and costing in both wireline and wireless communications.

At the Haas School of Business, University of California at Berkeley, Professor Harris taught undergraduate, MBA and doctoral courses in managerial economics, business and public policy, industry analysis and competitive strategy, telecommunications economics, policy and strategy. Professor Harris also conducted original academic research on competition and regulatory policy, technological innovation, competitive strategy, telecommunications and transportation. He published this research in journals of business, economics, law, management and public policy.

A renowned authority in the information and communications industries, Professor Harris is a consultant to telecommunications service providers and equipment vendors on industry analysis and competitive strategy; technological innovation and new product introductions; mergers, acquisitions and corporate restructuring; market entry and competitive dynamics; price analysis and pricing models; cost models and costing; public policy analysis and advocacy. Professor Harris also has extensive expert witness experience before state and Federal courts in business litigation involving many other industries, including high technology manufacturing and software, for which Professor Harris conducted and supervised economic analyses of market structure and competitive dynamics; costs, prices and pricing practices; market entry and exit; mergers, acquisitions and restructuring; and technological innovation and adoption.

Professor Harris served as the Deputy Director of the Interstate Commerce Commission, where he played an instrumental role in the implementation of Congressional acts deregulating the railroad and motor carrier industries. Professor Harris has been a consultant to numerous government agencies, including the Interstate Commerce Commission, the Office of Technology Assessment, the US Department of Justice, the US Department of Transportation and the US General Accounting Office, on regulatory and public policy regarding the telecommunications and transportation industries.